

REMARKS

The Office Action mailed August 8, 2005 has been received and the Examiner's comments carefully reviewed. Claims 1-19 and 22 have been cancelled. Claim 20 is amended. Claims 23 and 24 are new. Entry of these amendments is respectfully requested. Claims 20-21 and 23-24 are currently pending. For at least the following reasons, Applicants respectfully submit that the pending claims are in condition for allowance.

A. Rejections Under 35 U.S.C. § 103

The examiner rejected claims 19-21 under 35 U.S.C. § 103(a) as being unpatentable over *Gieseke et al.* (WO 01/47618) in view of *Kashiyama et al.* (US Patent 5,205,265). Applicants respectfully traverse this rejection.

As made clear in amended claim 20, Applicants' invention of claim 20 relates to the problem of retrofitting an existing, in-service diesel engine to reduce the engine emissions in an amount sufficient to satisfy a governmental regulation. The governmental regulations for engine emissions retrofits of this type can be very stringent and difficult to satisfy with existing technologies and within cost constraints.

The applicable government regulations for diesel engine emissions retrofits generally are characterized in terms of a required reduction in emissions. Applicants, however, have recognized that an in-service engine generates multiple sources of emissions, not only exhaust gas emissions, and that the control of these other sources of emissions could partially satisfy the regulations that require a reduction in emissions. For example, in addition to exhaust gas emissions, an engine typically also produces blow-by gas emissions, these being the gases that blow past the pistons and flow to the environment through a crankcase vent.

Certain means have been devised in the prior art for treating these blow-by gases, such as the *Gieseke* invention cited in the Office Action. Although the apparatus of *Gieseke* can filter a substantial portion of the emissions of the blow-by gas and prevent these emissions from reaching the atmosphere, such filtered blow-by gases still contain pollutants including gaseous pollutants as well as particulate matter not captured in the apparatus. The Applicants' invention includes recognizing that further treatment of these remaining pollutants is desirable, but that increasing the complexity of the blow-by gas treatment apparatus to further reduce these

pollutants is not desirable. Applicants also recognized that the filtered blow-by gas could be recirculated from the apparatus into the engine rather than being discharged to the atmosphere, so that the remaining pollutants would pass into the exhaust gas where the pollutants could be treated by an exhaust gas treatment system such as a catalytic converter. This approach uses an exhaust gas treatment system to more effectively treat the blow-by gases from a diesel engine than the blow-by gas treatment apparatus alone, without requiring increases in the complexity or expense of the blow-by gas treatment apparatus.

It is also noted that the Office Action states that “it is conventional to utilize a catalytic converter being located in the exhaust pipe to purify the exhaust gas from the engine.” (emphasis added). However, the invention is not limited to utilizing a catalytic converter in the exhaust pipe to purify the exhaust gas alone. Rather, the invention also includes utilizing a catalytic converter in the exhaust pipe to purify the blow-by gases from the engine, a gas stream that is normally isolated from the exhaust gas stream, and that in the current invention has been added to the exhaust gas stream. Neither *Gieseke*, *Kashiyama*, nor *Sera* suggest that a catalytic converter can be retrofitted to an engine to reduce blow-by emissions.

It is important to note that “[v]irtually all inventions are combinations of old elements.” Princeton Biochemicals, Inc. v. Beckman Coulter, Inc., 411 F.3d 1332, 1337 (Fed. Cir. 2005). Applicants recognize that the apparatus disclosed in *Gieseke* is in the prior art. Applicants also recognize that catalytic converters for diesel engine exhaust gases such as that of *Kashiyama* are in the prior art. However, Applicants’ combination of elements represents a novel approach to the problem of reducing emissions from diesel engines that is not disclosed or suggested by the prior art references.

For the foregoing reasons, Applicants respectfully submit that pending claims 20 and 21 are patentable.

B. New Claims

Applicants submit new claims 23 and 24 to more particularly claim the subject matter disclosed. These claims do not add new matter and are supported by the written description in the specification. It is respectfully submitted that none of the references cited in the Office Action teach a solution to the specialized problem of retrofitting an in-service diesel engine and

certifying that the modified engine satisfies governmental regulations for emissions reductions. Furthermore, as discussed above, it would not be obvious to a person skilled in the art to attempt to satisfy a governmental regulation that requires a certain reduction of emissions by treating a separate gas stream, such as the blow-by gas stream, that ordinarily is not subject to emissions regulations. In fact, a person of skill in the art would likely believe that the Applicants' approach of directing the blow-by gases to the intake port of the engine will cause at least a portion of the pollutants remaining in the blow-by gas to pass through the engine into the exhaust and increase the regulated exhaust gas emissions, thereby making it more difficult to satisfy the diesel engine emissions retrofit regulations. Because the invention is both novel and non-obvious, Applicants submit that the claimed invention is patentable.

Moreover, new claims 23 and 24 do not add new matter and are supported by the specification. See, for example, page 33 lines 13-15 ("These results are applicable to a broad range of engines including all highway, heavy-heavy and medium-heavy duty, 4 cycle, non-EGR, model year 1991-2003, turbocharged or naturally aspirated diesel engines ranging from 150 to 600 horsepower."); page 42, lines 2, 4 (describing system to retrofit of existing engines to reduce emissions); pages 27-30 (describing measurements of emissions and governmental regulations).

C. Objective Evidence of Non-Obviousness

There is objective evidence of the non-obviousness of Applicants' invention. See the attached Declaration of Julian Imes and associated exhibits (hereinafter "Imes Decl."). For example, the California Air Resources Board issues regulations that govern emissions retrofits of diesel engines in California. Imes Decl. ¶ 4. Among other things, these regulations define categories of emissions reductions for retrofit systems for diesel engines. As discussed in the declaration of Julian Imes, a retrofit system according to the invention disclosed by Applicants is the only retrofit system that has been verified to "Level 1" performance by the California Air Resources Board without requiring special ultra low sulfur fuels that are not commonly available and that is applicable to a broad range of engines. Imes Decl. ¶ 6, 9. The Applicants' system thereby provides significant benefits to end-users over the competitors' product. This innovation and product differentiation is despite the fact that the market for diesel exhaust emission control retrofit devices is highly competitive and technology-driven, such that if the invention were truly

obvious it is likely that it would have been adopted by other competitors. Imes Decl. ¶ 2. As such, the present invention constituted a “paradigm shift” in the approach to reducing emissions of an in-service diesel engine. Imes Decl. ¶ 8. Applicants respectfully submit that this evidence of non-obviousness further demonstrates the patentability of pending claims 20-21 and 23-24.

D. Cancelled Claims

Claims 1-19 and 22 are cancelled. Claims 11-14 were rejected under 35 U.S.C. § 103(a) as being unpatentable over *Gieseke* in view of *Kashiyama* (U.S. Patent No. 5,205,265). Claims 15, 16-18, and 19-21 were rejected under 35 U.S.C. § 103(a) as being unpatentable over *Gieseke* in view of *Kashiyama*, and further in view of *Sera* (US Patent No. 5,726,119). Applicants disagree with these rejections. Nevertheless, to advance this application and to expedite prosecution, claims 11-19 have been cancelled.

Claim 22 was rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. Applicants respectfully disagree with this rejection. As stated previously, claim 22 does not add new matter and is supported by the written description in the specification. See, for example, page 33, lines 12-15 and pages 34-42 for a discussion of applicable retrofit engines. See also, for example, the discussion on experimental testing from page 29, line 3 to page 42, line 7. In particular, see for example page 29, lines 10-21 for a discussion of the step of determining the baseline engine emissions, which are determined by measuring the untreated crankcase blow-by gases and the untreated tailpipe gases. See also for example page 29, lines 8-9 for a discussion of defining emissions as the sum of exhaust (tailpipe) and crankcase blow-by emissions. See for example page 31-32, tables 1-3 for examples where the tailpipe particulate matter emissions reduction efficacy percentage is calculated by subtracting the treated tailpipe emissions from the sum of the baseline crankcase emissions and baseline tailpipe emissions, dividing by the sum of the baseline crankcase emissions and baseline tailpipe emissions, and converting to a percentage. See also for example page 32 for a discussion of the California Air Resources Board retrofit particulate matter reduction requirements. Nevertheless, to advance this application and to expedite prosecution, claim 22 has been cancelled.

SUMMARY

It is respectfully submitted that each of the presently pending claims (claims 20-21 and 23-24) is in condition for allowance and notification to that effect is requested. The Examiner is invited to contact Applicants' representative at the below-listed telephone number if it is believed that prosecution of this application may be assisted thereby.

Although certain arguments regarding patentability are set forth herein, there may be other arguments and reasons why the claimed invention is patentably distinct. Applicants reserve the right to raise these arguments in the future.

Respectfully submitted,

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